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INSECTA MATSUMURANA

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DISCOVERY OF THE GENUS ECTROPINA FROM INDIA, WITH DESCRIPTION OF A NEW SPECIES (LEPIDOPTERA: GRACILLARIIDAE)

Research Trips for Agricultural and Forest Insects in the Subcontinent of India (Hokkaidô University, University of Calcutta, and Zoological Survey of India Joint Project) [Grants-in-Aid for Overseas Scientific Survey, Ministry of Education, Japanese Government, 1977; 1979, No. 404307], Scientific Report No. 2.

By TOSIO KUMATA

Abstract

KUMATA, T. 1979. Discovery of the genus *Ectropina* from India, with description of a new species (Lepidoptera: Gracillariidae). *Ins. matsum. n.s.* 18: 15 pp., 1 table, 30 figs.

Two species of *Ectropina* from India are treated. One of them, *E. acidula* (Meyrick), is transferred from the genus *Gracillaria*, and the adult is redescribed in detail. The other, *E. raychaudhurii*, is described as a new species, and all the larval instars are also described, with a short note on the larval behaviour. A close relationship between *Ectropina* and *Calybites* (=*Euspilapteryx*) is suggested on the basis of the larval characters.

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Introduction

The genus *Ectropina* was erected by Vári (1961) to accept 3 species of South African Gracillariidae. Since that time no species has been added to the genus at all. Recently, I have examined some specimens of Indian Gracillariidae. Some of them are preserved in the Zoological Survey of India, Calcutta, and the rest were collected in 1978 in connection with the "Research Trips for Agricultural and Forest Insects in Subcontinent of India (Hokkaidô University, University of Calcutta, and Zoological Survey of India Joint Project)". Among them I have found 2 species which undoubtedly belong to the genus *Ectropina*. One of them has been known as *Gracillaria acidula* (Meyrick), and the other is to be described as a new species.

These 2 species are very closely related to each other, so far as the colour-patterns of the adults are concerned. Their larvae are leaf-miners in their early instars and feed on *Phyllanthus* (Euphorbiaceae). But these species are easily separated from each other by the genitalia of both sexes. In this paper will be described not only the adults of the 2 species in detail but also the larva of the new species in all instars. The larval character and behaviour suggest that the genus *Ectropina* is closely related to the genus *Calybites* Hübner, 1822 (=*Euspilapteryx* Stephens, 1835) as discussed in the later lines.

Genus *Ectropina* Vári

Ectropina Vári, 1961, Transv. Mus. Mem. 12: 36 [type-species: *Ectropina sclerochitoni* Vári, 1961].

The genus *Ectropina* is easily distinguishable from any other genera of the Gracillariidae by the following points of the hind wing venation: — the vein M_3 is stalked with the stem of the veins M_1 and M_2, and the discoidal cell opens between the veins M_3 and Cu_{1a}. Although it has such peculiar characters, *Ectropina* appears to be related to the genus *Caloptilia* in some respects of the adult as pointed out by Vári (1961).

In this study the larva of the new species of *Ectropina* has been examined, and it suggests that *Ectropina* is more closely related to the genus *Calybites* (=*Euspilapteryx*) than to *Caloptilia*. The genera *Ectropina* and *Calybites* are similar in the chaetotaxy of the body and are clearly distinguished from *Caloptilia* by the subventral setal group having only 1 seta on the 1st, 6th and 7th abdominal segments, and 2 on the 2nd segment, instead of 2 and 3, respectively, in *Caloptilia*. Moreover, in late instars the larva of *Ectropina* makes a deep cut on the host-leaf, then rolls up the part cut off into a cone on the lower side of the leaf. Pupation takes place inside a spindle-shaped cocoon which is always formed inside the cone. This pattern of behaviour is also seen in the larva of *Calybites*, insofar as I am aware. On the other hand, the larva of *Caloptilia*, though it makes a cone from the host-leaf, usually does not cut the leaf-margin; the pupation usually takes place outside the cone; and the cocoon is boat-shaped as usual.

Key to the Indian species of Ectropina based on genitalia

In male, tegumen with a pair of rather acute falces; valva moderately long, with its ventro-apical corner produced into an acute projection. In female, ductus bursae sclerotized

between caudal 1/4 and middle; 7th abdominal segment with a transverse band of sclerotization on sternum. .....*E. acidula* (Meyrick)

In male, tegumen with falces absent; valva rather short, with its ventro-apical corner evenly round. In female, ductus bursae membraneous on entire length; 7th abdominal segment with sternum more or less sclerotized on whole area. .....
.....*E. raychaudhurii*, sp. nov.

Ectropina acidula (Meyrick), comb. nov.

Acrocercops acidula Meyrick, 1911, Ent. M. Mag. 47: 213.

Gracilaria acidula: Meyrick, 1912, Lep. Cat. 6: 53; ibid., 1918, Exotic Microlep. 2: 178.

Gracillaria acidula: Fletcher, 1920, Mem. Dept. Agr. India 6: 162, pls. 43–44.

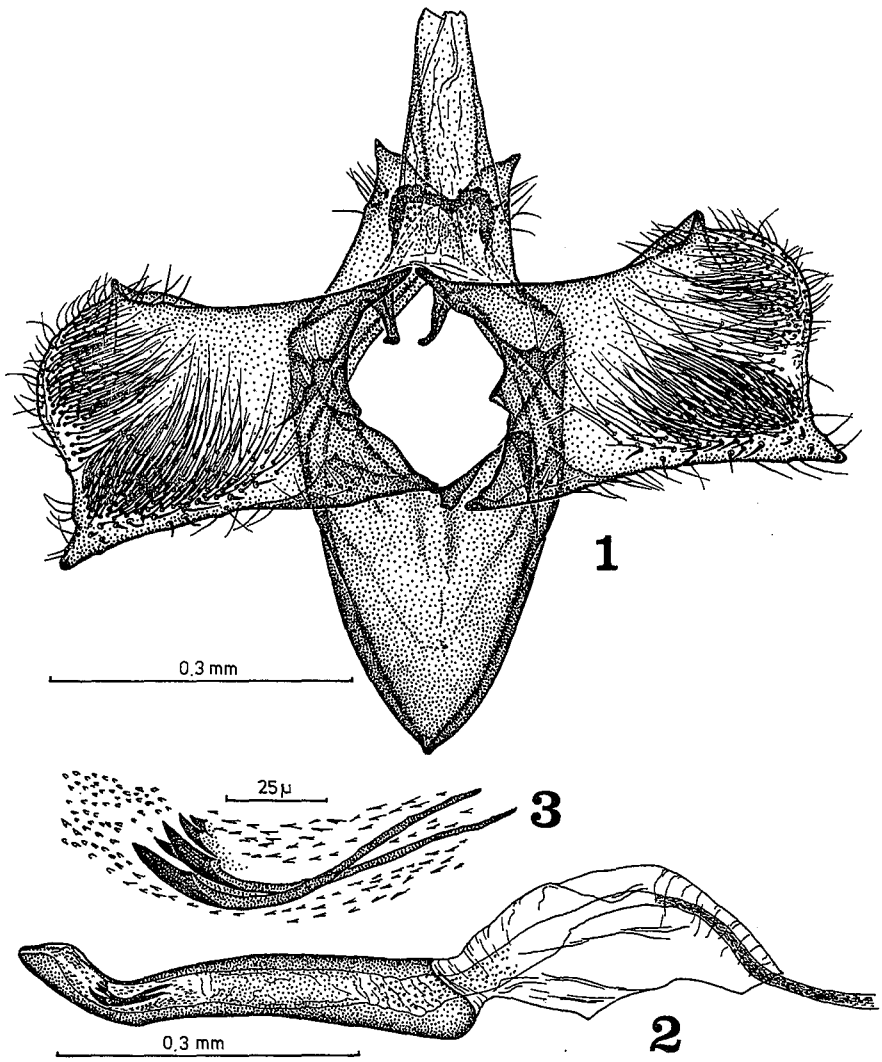
Original description: "♂♀. 6 mm. Head whitish, more or less partially suffused with dark fuscous. Palpi whitish with three dark fuscous bands. Thorax fuscous, irrorated with darker, posteriorly with some whitish scales. Forewings elongate-lanceolate; purplish-fuscous irrorated with dark fuscous; three slender yellow-whitish transverse fasciae edged with some blackish scales, first at one-fourth, rather oblique, tending to be interrupted near dorsum, second median, direct, third at four-fifths, slightly incurved, hardly reaching termen; cilia greyish, with rows of blackish points. Hind-wings and cilia grey. Hab.: Pusa, bred in June from larvae mining leaves of *Albizzia stipulata* (Leguminosae); three specimens (Fletcher)."

Additional description: ♂♀. Expanse of wings: 6.0–6.2 mm. Length of fore wing: 2.9–3.0 mm.

Colour: Antenna pale brownish, annulated with darker colour; scape and its basal pecten dark brown. Labial palpus whitish; second segment very slightly thickened apically, dark brownish on apical half; apical segment slender and pointed, with dark brownish median band outside. Maxillary palpus short, whitish, with a subbasal dark brownish band and a median one outside. Legs dark brownish; fore coxa whitish on basal half; fore and mid femora and tibiae with 1 or 2 whitish bands; hind femur whitish, with 3 narrow dark bands outside; hind tibia whitish, sprinkled with brownish spots; all tarsi pure white, narrowly ringed with dark brown at apex of each segment. Fore wing with 3 pale lemon-yellow fasciae as described originally; in addition to these markings 3 fasciae of pale brownish colour are seen in the specimens examined, sometimes they are indistinct in outline, the 1st one situated in centre between 1st and 2nd yellowish fasciae, usually detached from dorsum, the 2nd one in interspace between 2nd and 3rd yellowish fasciae, direct or oblique inwardly, not reaching dorsum, the 3rd one near apex of wing, quadrangular, detached from costa and termen.

Male genitalia (Figs. 1–3): Tegumen short, densely squamose along apical margin, which is shallowly notched medianly; falces moderately produced, rather acute apically, with several fine setae on sides; tuba analis long-produced beyond falces, weakly sclerotized on ventral face throughout. Valva moderate in length, parallel-sided, with ventro-apical corner produced into a short projection and costo-apical corner round; a much sclerotized, short projection at apical 1/4 of costal margin; many slender setae rather sparsely scattered on upper half of apical area of valva, and similar, but a little thicker ones on the lower half more densely. Saccus very large, slightly shorter than valva, tapering apically. Aedoeagus (Fig.

2) a little longer than valva, tubular, slightly narrowing apically, curved near apex, with 2 moderately large and 3 or 4 small cornuti (Fig. 3). Seventh and 8th abdominal segments weakly membraneous, the former very sparsely bearing orbicular scales, and the latter being bare; 2 pairs of coremata all more or less same in length and thickness.



Figs. 1–3. *Ectropina acidula* (Meyrick). 1: ♂ genitalia in caudal view — 2: aedoeagus — 3: cornuti enlarged.

Female genitalia (Fig. 4): Papilla analis moderate in length, tapering ventrally; apophysis posterioris long, slender, slightly widened basally. Eighth abdominal segment short, bare; apophysis anterioris short, about 1/3 as long as apophysis posterioris. Seventh abdominal segment normally squamose, the sternite being widely notched medianly on caudal margin, with a narrow, transverse

central band of sclerotization. Genital plate wide-obovate in shape, with a longitudinal median cleft on cephalic side; many microspines sprinkled around the cleft. Ductus bursae slender, scobinated with microspines on caudal 1/4, then strongly sclerotized between caudal 1/4 and middle, and remaining cephalic part membraneous. Corpus bursae pyriform, membraneous; a signum long, corniform, slightly curved, flattened at its base.

Fig. 4. *Ectropina acidula* (Meyrick), ♀ genitalia in ventral view.

Specimens examined: 1♂ & 1♀, labelled "*Gracillaria acidula* Meyr., named by T.B.F./3. VI. 10, *Albizzia stipulata*, C.S. 837/Paratype". Including the present material, there are preserved in the collection of the Zoological Survey of India, Calcutta, 7 specimens in all and with the same data. Though they are all labelled "paratype", they may not be types used by Meyrick in the original description. Judging from the collection labels, however, they seem to belong to the same rearing series with the type material.

Food plant: *Phyllanthus emblica* Linné (Euphorbiaceae). Meyrick originally stated that the larva of *acidula* mined leaves of *Albizzia stipulata* (Leguimnosae). In 1918, however, he emended the identification of the food plant to *Phyllanthus emblica* according to information given by Fletcher, the collector of the specimens.

Distribution: India (West Bengal).

Remarks: The larval habit of this species is described by Fletcher (1920) in detail.

Ectropina raychaudhurii, sp. nov.

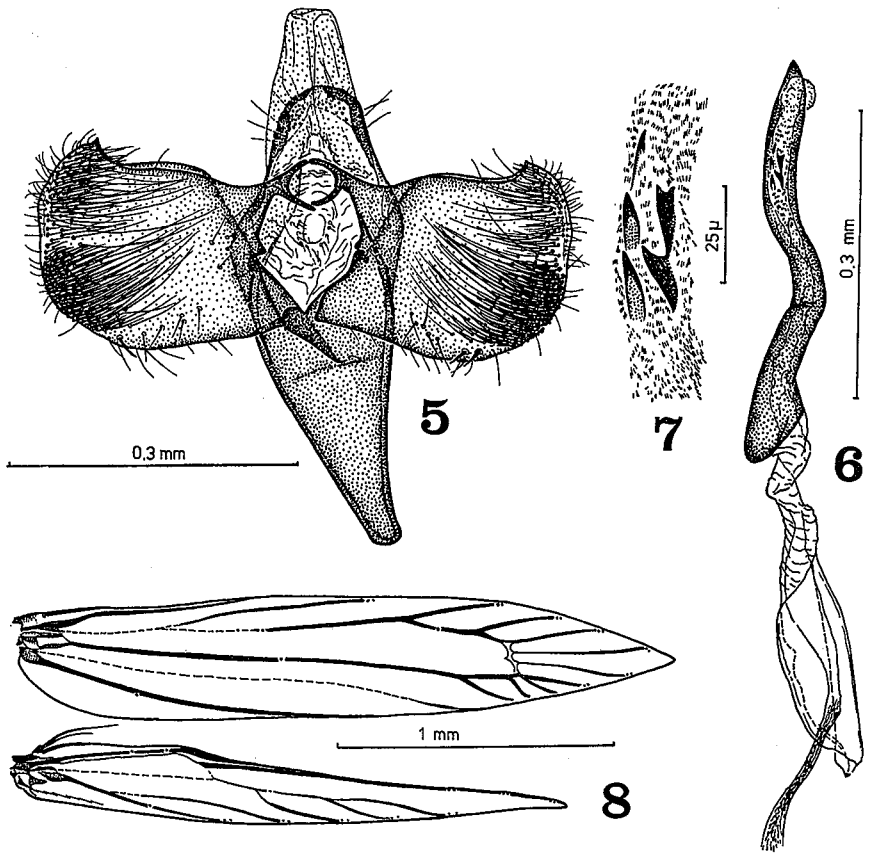
Adult

♂ ♀. Expanse of wings: 5.3–6.6 mm. (5.5 mm. in holotype and 5.9 mm. in average of 23 specimens). Length of fore wing: 2.5–3.4 mm. (2.7 mm. in holotype and 2.3 mm. in average of 23 specimens).

Colour: Face whitish, slightly darkened on anterior and lateral areas; head on vertex grayish, sprinkled with blackish spots. Palpi whitish; maxillary palpus suffused with blackish spots outside except at base and apex; 2nd segment of labial palpus moderately thickened with scales apically, suffused with blackish spots especially heavily on outer side, the apical segment with a blackish median ring and a subapical one which is indistinct and completely absent in a few specimens. Antenna pale brownish, annulated with blackish brown; scape heavily suffused with blackish-brown spots, with pecten darkened apically. Thorax dark brownish-gray dorsally, mixed with blackish scales anteriorly and whitish scales posteriorly; pleural surface brownish-black, with a whitish oblique band. Legs brownish-black; fore coxa whitish on basal half; middle femur with 2 or 3 paler bands or blotches on upper side; hind femur whitish, with 3 blackish bands outside; all tarsi white, with a blackish, narrow apical ring on each segment except for 1st segment of hind tarsus, which is entirely blackish. Fore wing dark brownish-gray, suffused with blackish spots throughout, with 3 whitish-yellow transverse fasciae all margined with blackish spots on both internal and external edges; 1st fascia placed at basal 1/5 of wing, narrow, oblique outwardly, sometimes interrupted by reddish-brown scales near dorsum; 2nd at middle, straight or slightly arched externally; 3rd at apical 1/4, widest at costal margin, direct towards tornus, with its dorsal half always changing to reddish-brown; in addition to these yellowish fasciae 2 reddish-brown transverse fasciae are seen in most specimens including holotype, one of them placed in interspace between 1st and 2nd yellowish fasciae, always detached from dorsal margin, another one in interspace between 2nd and 3rd yellowish fasciae, usually interrupted at middle into paired streaks; a reddish-brown transverse mark situated near apex of wing, slightly arched internally; cilia brownish-gray, with 3 parallel rows of blackish spots running around apex of wing. Hind wing and its cilia dark brownish-gray. Abdomen dark brownish-gray, with an oblique band at side of each segment white except for last one which is entirely ochreous-yellow; coremata pure white.

Male genitalia (Figs. 5–7): Tegumen short, round apically, densely squamose on apical margin, with several fine setae on sides; falces absent; tuba analis moderately long, weakly sclerotized on ventral face throughout. Valva rather short, a little longer than wide; terminal margin evenly round; costal margin sinuate, with a short, acute projection near apex; many slender setae sparsely scattered on

upper half of apical area of valva, and a little thicker setae densely on the lower half. Saccus long, about 1.3 times as long as valva, tapering towards truncated apex. Aedoeagus (Fig. 6) about 1.8 times as long as valva, tubular, strongly sinuate at middle, with 5 or 6 small cornuti (Fig. 7). Seventh and 8th abdominal segments weakly membraneous, each with a transverse row of sparse, orbicular scales; 2 pairs of coremata all nearly same in length and thickness.



Figs. 5–8. *Ectropina raychaudhurii*, sp. nov. 5: ♂ genitalia — 6: aedoeagus — 7: cornuti enlarged — 8: wing venation.

Female genitalia (Fig. 9): Papilla analis short, oblong, tapering ventrally, sparsely setose: apophysis posterioris long, slender, strongly widened on the basal half. Eighth abdominal segment very short, bare; apophysis anterioris about half as long as apophysis posterioris. Seventh abdominal segment squamose as usual; sternite sclerotized a little more strongly than tergite, trapezoid, with caudal margin shallowly emarginate medianly. Genital plate suborbicular in shape, with a longitudinal cleft opening in the centre; dense microspines sprinkled around the cleft. Ductus bursae narrow, membraneous throughout, finely scobinated with microspines on the caudal half. Corpus bursae ellipsoidal or pyriform, membraneous; a signum long, slender, corniform, curved, flattened at the base.

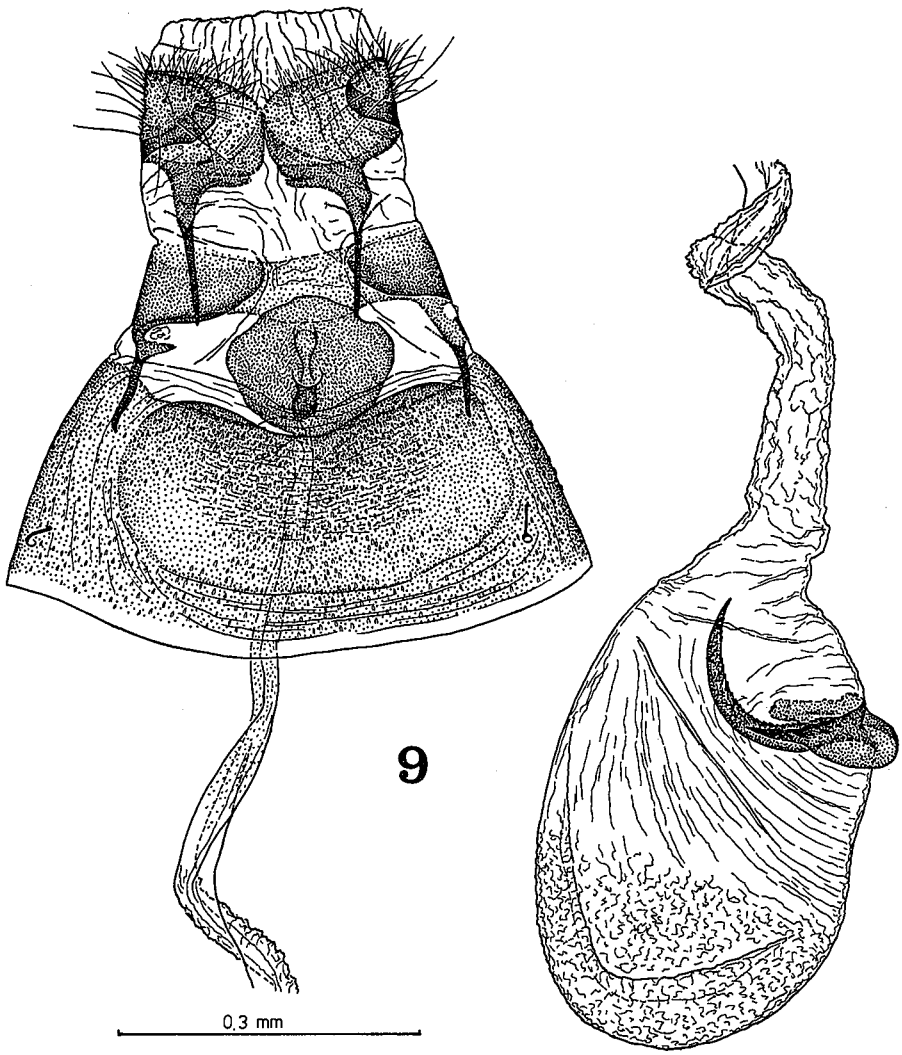


Fig. 9. *Ectropina raychaudhurii*, sp. nov., ♀ genitalia in ventral view

Larva

There are 6 instars in the larval period, the first 2 being of the sap-feeding type and the last 4 of the tissue-feeding type (see Table 1).

Sixth instar: Head (Fig. 10) round as usual, with coronal suture about 1/4 as long as frontal suture; adfrontal suture not visible; posterodorsal prolongations not developed. Epicranial seta A_2 posterior to level of setae A_3; P_1 and A_3 the longest among epicranial setae. Ocelli (Fig. 16) 6 on each side, arranged in a semicircle, all nearly same in size; O_2 the longest among ocellar setae, set closer to 1st ocellus than to 6th one. Antenna (Fig. 17) 3-segmented, with sensillae as usual in lepidopterous larvae; a long sensillum trichodeum about 3 times as long as a shorter one; a sensillum styloconicum 2-segmented, longer than sensilla basiconica. Labrum (Fig. 15) about a half as long as wide, shallowly notched apically, the

Table 1. *E. raychaudhurii*, larvae: measurements, feeding forms and feeding sites.

Instar	Length of frontoclypeus in micra			Larval form	Feeding site
	n	range	mean		
1st	5	87.5- 95.0	89.5	Sap-feeder	Inside leaf-mine
2nd	5	107.5-117.5	112.5	Sap-feeder	Inside leaf-mine
3rd	8	90.0-110.0	103.0	Tissue-feeder	Inside leaf-mine
4th	8	120.0-132.5	125.5	Tissue-feeder	Inside leaf-mine
5th	2	170.0-175.0	172.5	Tissue-feeder	Inside leaf-cone
6th	3	222.5-230.0	226.5	Tissue-feeder	Inside leaf-cone

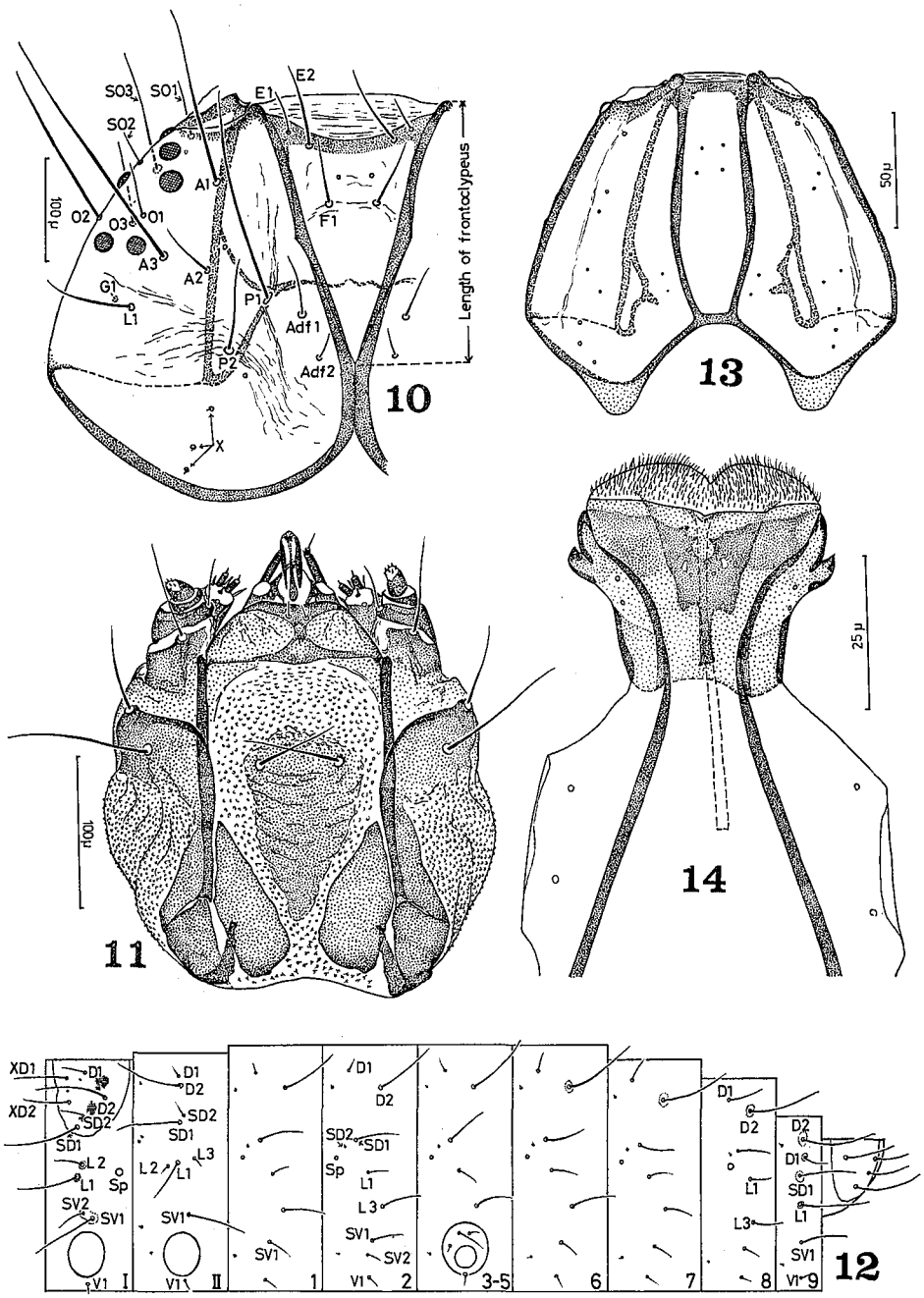
lateral lobes round apically; 3 lateral and 3 median labral setae on each side, the setae L_2 and M_3 being the longest; 2 large epipharyngeal setae and a small one on ventral face of each side; epipharyngeal shield heart-shaped. Mandible (Fig. 18) with 5 teeth, the 3rd tooth (numbered from outer side) being the longest, and the 5th small, round, with 2 or 3 crenulations. Labiomaxillary complex (Fig. 11) resembles that of the most lepidopterous larvae in shape and structure; spinneret about 2.5 times as long as wide, about 2 times as long as basal segment of labial palpus, slightly narrowing basally; a median sclerite of postmentum subtriangular, with setae very slightly posterior to level of longer setae of maxillary stipes.

Body cylindrical, slightly tapering posteriorly. Thoracic legs (Fig. 19) well developed, moderately sclerotized; tarsi with 4 setae as usual; claw as shown in Fig. 19. Ventral prolegs (Fig. 20) located on 3rd to 5th abdominal segments, with uniordinal crochets arranged in a lateral penellipse (24–29) plus a vertical row (8–10); anal proleg with crochets in a semicircle (14–15). Spinules of body surface (Fig. 21) minute, pointed, very dense. Chaetotaxy of body as shown in Fig. 12; it is very similar to that of *Gracillaria syringella* Fabricius reported by MacKay (1972), but is distinguished from the latter by the following points: setae SV_2 and SV_3 absent on 1st, 6th and 7th abdominal segments, the latter also absent on the 2nd segment; seta SD_1 the longest and about 1.5 times as long as L_1 on anal shield; a pinaculum, or a small basal sclerite of seta, usually absent except in D_2 on 6th to 9th abdominal segments, SD_1 on 9th abdominal segment, and L_1, L_2, SV_1 and SV_2 on prothorax, but these pinacula are generally very small and weak.

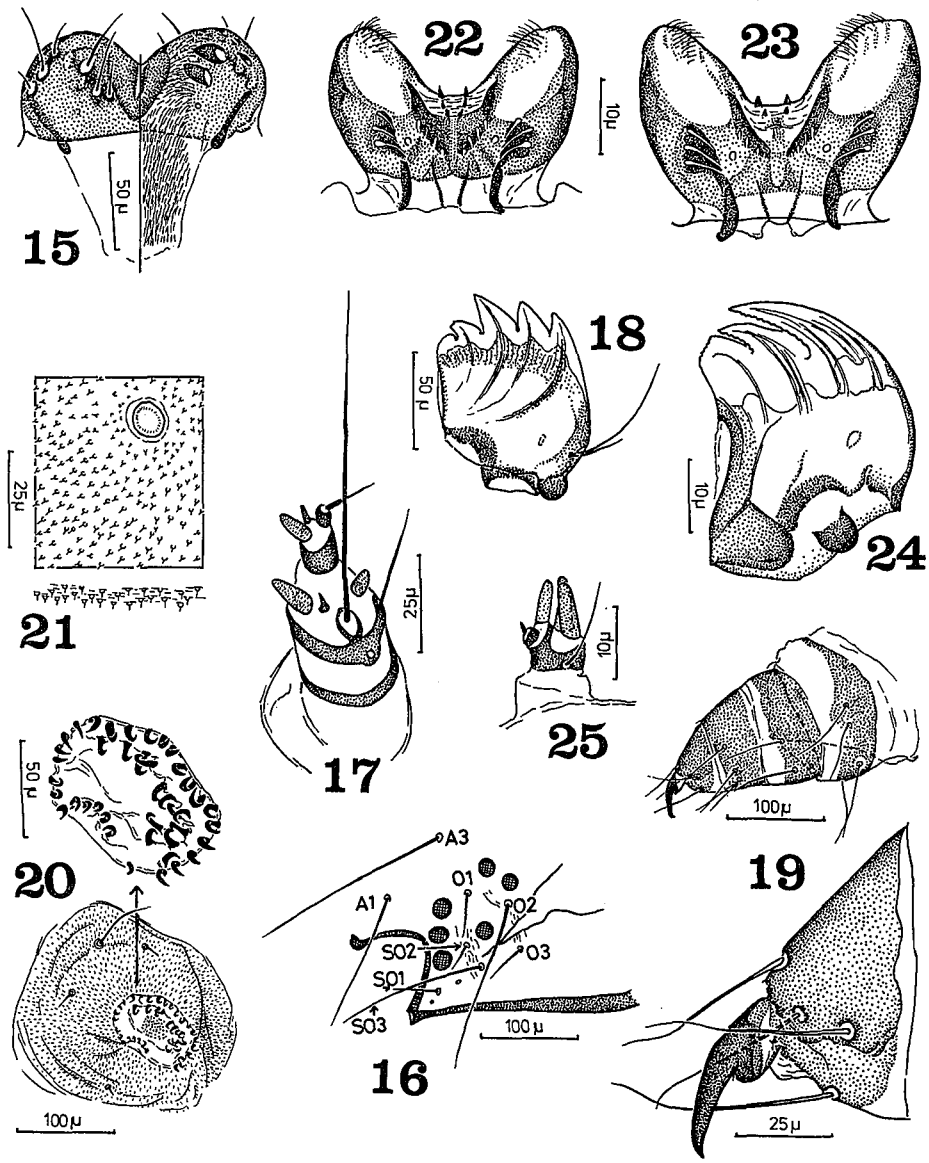
Fifth instar: Not essentially different from 6th instar except for anal proleg with crochets a little less numerous (11–12).

Fourth and 3rd instars: Only exuviated head-capsules examined. Coronal suture very short and less than 1/10 length of frontal suture. Posterodorsal prolongations of epicranium slightly developed, triangular, weakly membraneous. Other characters of head as given under 6th instar.

Second instar: Only exuviated head-capsules examined. Head (Fig. 13) thinly flattened dorsoventrally, wedge-shaped, narrowly sclerotized on lateral ridges, prognathous, with posterodorsal prolongations moderately developed and triangular. Frontoclypeus oblong, slightly tapering posteriorly and anteriorly, with posterior transverse bar slightly shorter than anterior clypeolabral ridge. Epicranial setae A_1 and P_1 microscopic, and the others indicated by basal socket only; A_1, A_2, A_3 and L_1 arranged in a nearly straight line along lateral ridge of epicranium. One ocellus visible at anterior extremity of each lateral ridge of epicranium. Antenna (Fig. 25) 3-segmented, but the basal segment completely



Figs. 10–14. Larva of *Ectropina raychaudhurii*, sp. nov. (10–12, last instar, and 13–14, 2nd instar). 10 & 13: epicranium in dorsal view — 11 & 14: labiomaxillary complex — 12: body chaetotaxy.



Figs. 15–25. Larva of *Ectropina raychaudhurii*, sp. nov. (15–21, last instar, and 22–25, 2nd instar). 15: labrum (left side in dorsal view, right side in ventral view) — 16: ocelli and adjacent setae — 17 & 25: antenna — 18 & 24: mandible — 19: mesothoracic leg with claw enlarged — 20: ventral proleg on 5th abdominal segment with crochets enlarged — 21: spinules of body surface — 22 & 23: labrum.

membraneous and the 2nd segment partly fused with the 3rd at mesial side; a sensillum styloconicum minute, 2-segmented; a sensillum trichodeum moderate in length, slightly longer than antenna. Labrum (Figs. 22 & 23) about 2/3 as long as wide, rather deeply notched on anterior margin, with two or three pairs of small thorn-like spines on median area near anterior margin; lateral lobes round apically,

with hair-like spines on mesial side near apex. Mandible (Fig. 24) flat, 3-toothed; 3rd tooth with about 10 crenulations along truncated apical margin. Labiomaxillary complex (Fig. 14) much simplified, very flat dorsoventrally, without any distinct setae; prementum much widened anteriorly, truncated apically, without palpi and a prominent spinneret; maxillary palpifer narrow, with two lobes at apex, the outer lobe (supposed undeveloped maxillary palpus) shorter than the mesial lobe (supposed galea); hypopharynx protruded well beyond labium, bilobed apically, covered with many hair-like spines.

First instar: Only exuviated head capsules examined; not different from the 2nd instar except for size.

Specimens examined: Adult — 10♂♂&14♀♀. Holotype: ♂ (G. sl. no. Grc–2260), Madras, Tamil Nadu, India, em. 10/II/1978, ex *Phyllanthus niruri*, breeding no. Ind–7. Paratypes: 9♂♂ & 14♀♀, with the same data as for the holotype except in date emarged, 1–17/II/1978. Five males and 7 females, including the holotype, are deposited in the collection of the Entomological Institute, Hokkaidô University, and the rest in the collection of the Zoological Survey of India, Calcutta.

Larva — One and 2 larvae of 6th and 5th instars, respectively, and 5, 5, 8, 8 and 2 exuviated head-capsules of 1st, 2nd, 3rd, 4th and 6th instars, respectively, breeding no. Ind–7, all mounted on slides.

Food plant: *Phyllanthus niruri* Linné (Euphorbiaceae).

Distribution: India (Tamil Nadu).

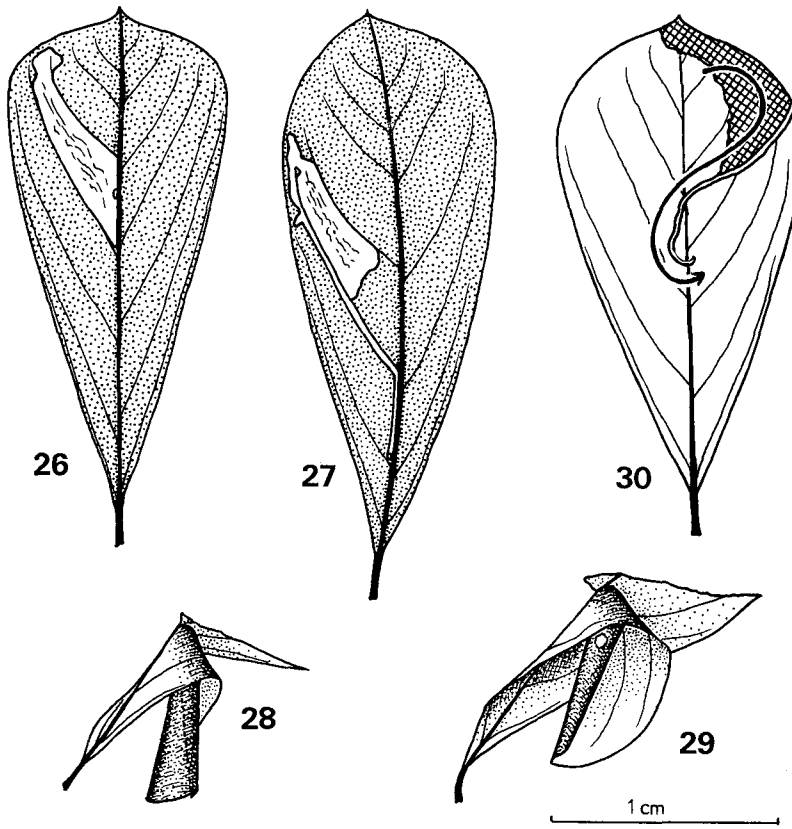
Larval habit: The egg is laid singly at the side of the vein on the lower surface of the host-leaf. Upon emergence the 1st instar larva mines the lower layer of spongy parenchyma just above the lower epidermis, and makes a small blotch-mine or sometimes a linear mine along the leaf-vein. In the 2nd instar the larva broadens the mine into a large blotch, which finally occupies almost the full area between 2 branching veins. Up to this stage the mine is flat and seen only on the lower surface of the leaf, the mining part being whitish in colour. In the 3rd and 4th instars the larva, which has been transformed into tissue-feeding type as described above, feeds on the remaining tissues within the blotch-mine. The tissues are consumed by the 4th instar larva; thus, at this time, the upper epidermis of mining part is completely separated from the lower and turns pale or deep brown in colour. The fully matured mine is slightly contorted by larval silken threads into a tentiform one; the size is 7 mm. to 9 mm. in length and 1.8 to 2.5 mm. in width (see Figs. 26 & 27).

After the 4th moult, the 5th instar larva leaves the mine through a round hole and migrates to another leaf, which is usually located more distally on the branch. It cuts the leaf from the edge towards the midrib; the part cut off is rolled up from the edge to form a cone on the underside of the leaf (see Figs. 28–30); then the larva continues to feed inside the cone. The larva passes 2 instars within this cone, or in the 6th instar it changes the leaf to make another cone. When fully grown the larva forms a whitish, spindle-shaped cocoon inside the cone, which has a small, round, semitransparent window on the side near the base.

Remarks: This species is related to *E. ligata* (Meyrick, 1912) of South Africa rather than to *E. acidula* (Meyrick, 1911) of India in some respects. It may, however, be distinguished from *ligata* by the smaller size (in *ligata* the expanse of wings, 7.5–9 mm., whereas in *raychaudhurii*, 5.3–6.6 mm.), by the tegumen without paired falces, by the valva a little longer than that of *ligata* in male, and

by the genital plate with a longitudinal cleft opening in the centre in female.

The name of this new species is dedicated to Prof. D.N. Raychaudhuri of the Zoological Department of the University of Calcutta, India.



Figs. 26–30. Leaf-mine and cone of *Ectropina raychaudhurii*, sp. nov. 26 & 27: leaf of *Phyllanthus niruri* (lower surface) with a mine — 28 & 29: leaf with a cone — 30: leaf with a cone unfolded (arrow showing the rolling direction and meshes showing the area eaten by the larva).

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